

## Best Prospects for Gasification: 2nd-Generation Biofuels, Emerson Believes

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When Emerson Process Management started concentrating on gasification a few years ago, the company thought the future for the technology was in integrated gasification combined cycle (IGCC) power plants.

Today, because of the high costs of IGCC development, Emerson sees the most potential for the technology in second-generation biofuels projects that can be brought on line which much lower capital costs, company officials told *Gasification News* in a recent interview.

Emerson started looking at building its gasification business about five years ago, according to Al Novak, Emerson Process Management's director for the Alternative Fuels Industry.

Novak was in the company's Power & Water Solutions group at the time, and "it looked like IGCC was going to be the next big thing," he said. "But as we dug into it, it became apparent gasification had better economics when used to produce products other than electricity."

Novak said the technology addressed energy security and supply issues by using domestic resources, such as coal, "while providing a better environmental profile."

This made development particularly attractive in the United States and China, the top two coal producers in the world. The company began to note a shift in projects away from the power market to production of other end products, including transportation fuels, substitute natural gas, hydrogen and chemicals.

Since the cost of IGCC was relatively high compared with conventional coal or natural gas power plants, cost served as a deterrent to development of the technology, Novak said. While changing from power production to industrial uses may seem like a major shift, it was natural for Emerson because the company is focused on the technology itself and not on the industry in which it is employed, he said.

"We are treating the entire industry as Alternative Fuels. We don't separate gasification applications based on the end product – the gasification process is the common element," he said. "The unit operations are fundamentally the same no matter what industry it's being used in, it's just the back end processing that changes the product."

### -- Intermediate Processing

Another impetus for the company to focus on industrial uses was the course of development for the technology in China, where gasification was developed for use in the production of chemicals, methanol and dimethyl ether used as a blend for LP-Gas or as a substitute for diesel fuel. "Their interest from the beginning was energy security and diversity of supply ... and they are just now starting to look at their first IGCC plants," Novak said.

Considering the technology from that perspective, gasification is "a very efficient way to convert biomass into an intermediary form that you can then turn into something else. If you look at second-generation biofuels, you have multiple paths such as gasification, chemical processes, custom enzymes and acid hydrolysis. Some of these are fairly new and still in the development stage, while the basic gasification process has been around since the late 1800s," Novak observed.

Emerson has been involved with gasification plants in the United States since the 1980s, he said. Then, in 2004 the company was chosen to serve as the general automation contractor for OPTI Nexen's C\$6 billion Long Lake facility in Canada, where its "PlantWeb" architecture is being used to automate heavy oil gasification to power oil sands upgraders.

The plant, which brought its first phase on line in October, is expected to produce 70,000 barrels of bitumen a day, to be upgraded to 60,000 barrels of premium synthetic crude oil a day by 2010. But due to the credit crunch, project partners OPTI Canada and Nexen Inc. have delayed any decision about continuing with the other four planned phases, each of which would produce the same amount.

As the automation contractor, Novak said Emerson implemented a high-fidelity simulator to build a full virtual gasification facility. "The biggest advantage was that it allowed OPTI Nexen to check out the facility before it went on line," he said. "It also helps with training, before you put people on the actual operating unit."

Novak noted that the Long Lake facility is located in rural Alberta, where "there isn't a large pool of skilled labor to operate the plant, so it was very useful there." Emerson also has high-fidelity simulators operating in a number of power projects, he said.

### -- Integrated Technology, Consulting

Novak attributes Emerson's success in alternative fuels to its ability to integrate its technology with consulting solutions. "Our products are really designed for this kind of application: high temperature and pressure, highly interactive control and safety requirements, high wear applications for control valves," he said.

In addition, he said, Emerson is "uniquely positioned to provide digital intelligence in the field devices which is tightly coupled with the control. This provides faster start-up and check-out for projects, with on-going maintenance savings through predictive diagnostics in a harsh process environment."

Another advantage, he said, is the company's integrated safety approach, which implements the control and the safety-instrumented system in the same architecture. With intelligence built into the process sensors and final control elements, plant operators can do predictive maintenance to avoid problems down the road. "We have actually implemented these technologies, and the capability sets us apart in the market," he said.

According to Novak, what differentiates Emerson from its competitors, such as ABB and GE, is its focus on the technology, not the industry in which it is employed. "The thing we do differently is flexibility as regards the end product," he told *GN*. "Others in the market are strong in a single specific application, such as power generation. Power is one of the industries we serve. We also automate oil and gas, and chemical market facilities. This versatility is a real advantage when you deploy something like gasification that is not industry specific," Novak said.

-- *Following the Technology*

For the present, the technology focus is leading Emerson to the alternative fuels industry. "Alternative fuels and gasification are a great confluence of our equipment and expertise – it's what we do," Novak said.

In particular, the company is focusing on second-generation biofuels, where he believes Emerson's experience in other industries will give it the flexibility and expertise to act as Main Automation Contractor (MAC). The MAC concept engages suppliers early in the design phase, at the Front End Engineering and Development (FEED) or pre-FEED stage.

While this can increase a project's front-end cost slightly, "contractors and owner-operators get a tremendous savings in project risk, schedule and ultimately cost," according to Novak. "It avoids the up-front writing of a generic spec that won't be met. It avoids trying to force-fit a vendor's equipment into the project."

He said second-generation biofuel facilities benefit from the MAC process because they tend to be smaller plants, and many are start-up entities that are still working with venture capital or securing initial capital investments. "The biofuel organizations tend to be fairly small. As their MAC, we bring expertise from other industries, and we get the project vendors involved early in the project to pool our expertise," Novak said.

The technology focus gives Emerson opportunities to capitalize on now, with gasification-based biofuels projects able to move faster than large-scale coal/petcoke projects because of the capital costs – \$200 million to \$300 million for a second-generation biofuels operation, versus \$2 billion for a gasification project, Novak said.

Focusing on the technology, not its end use, also gives Emerson the flexibility to change direction when the prospects for bigger gasification projects improve. Novak said the company hopes to be involved in the \$3 billion carbon capture project being designed in Abu Dhabi by government-owned Masdar, which plans to produce CO<sub>2</sub> for use in enhanced oil recovery.

He also believes Emerson will become involved in oxycombustion if it comes into the mainstream.

Research and development continues to be a focus for Emerson Process Management, Novak said, noting that 35 percent of sales in 2007 came from new products. The company also is considering some acquisitions that Novak would not discuss.

He noted that acquisitions Emerson made before it knew gasification would be a significant area – particularly, Rosemount in 1976, Fisher Control in 1992 and Westinghouse Process Control in 1998 – helped the company build the expertise it now puts to use in alternative energy projects. -- *Hazel Becker*

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